

0458
a license from GAF oleyl methyl tauride and other alkyl amide sulfonates at a greatly reduced cost. Furthermore, by blending this with soap and builders, or with soap alone, it would give them a product which would be more competitive in properties, and price, against straight built synthetic detergents in all areas of varying degrees of water hardness.

The product mentioned typifies only one way in which synthetic detergent manufacturers can open new markets for the soap industry. The mere fact that soap has done its job well for a few thousand years doesn't mean that it can't or shouldn't be improved. As our housewives become better acquainted with the properties of synthetic detergents you won't be able to sell them anything else. As the synthetic manufacturers find new and increased applications for surface active agents you too will have to provide the type of product that gives promise for faster, more efficient plant operation and better, longer lasting, low cost products.

The synthetic detergent manufacturer recognizes the fact that his efforts must be devoted to finding new products, new applications and to increasing present consumption of what he now makes if his industry is to continue to remain a vital factor of the country's economy. His program of research and development is designed with this in mind. You, the soap manufacturers, will find it to your advantage to keep pace with this program, and to keep in touch with the synthetic detergent manufacturer. For in his hands lies not only the future of his industry, but also, of yours. (Applause)

CHAIRMAN WILSON: Thank you, Dr. Terry, for a very interesting talk.

Our next speaker, Dr. Waldo C. Ault, of the Eastern Regional Laboratory of the Department of Agriculture, has made many important contributions to the technology of our industry. He was born in Ohio on August 21, 1905, and educated at Ohio State University, from which he received his Doctor's degree in 1934. He worked as a research chemist for the Thomas & Hochwalt Laboratories Division of the Monsanto Chemical Company from 1934 to 1938 and in a similar capacity with the United Gas Improvement Company in Philadelphia from 1938 to 1941. Following one year at the Northern Regional Research Laboratory at Peoria, Illinois, he became head of the Oil and Fat Division of the Eastern Regional Research Laboratory near Philadelphia in 1942. He is a member of the American Chemical Society, the American Oil Chemists Society, the Organic Chemists Club of Philadelphia, and Phi Beta Kappa.

One of the special fields of research at the Eastern Regional Laboratories has been better utilization of domestic fats and oils. I understand that an extension of the program is now being initiated and it is not unreasonable to expect that it will embrace some of the products of the detergent field.

Dr. Ault will discuss the subject, "Progress of Government Research on Animal Fats." Dr. Ault! (Applause)

DR. WALDO C. AULT: Mr. Chairman, Ladies and Gentlemen: I think here on this platform, in the last half-hour or thereabouts, we have gone from soap through petroleum detergents, as we saw from Dr. Terry's speech, and now we are sort of coming back to tallow again. I think that where the pendulum stops in this swinging back and forth, nobody knows, but we hope to play some small part in the Eastern Regional Laboratories.

The Eastern Regional Research Laboratory, near Philadelphia, is one of the Laboratories authorized by Act of Congress in 1938, the Secretary of Agriculture being directed by the Act to establish four laboratories to search for new and wider outlets and markets for farm commodities. The substance of the legislation creating the laboratories is contained in the following paragraph, taken from the Act: "The Secretary is hereby authorized and directed to establish, equip and maintain four regional research laboratories, one in each major farm producing area, and at such laboratories to conduct researches into and to develop new scientific, chemical and technical uses and new and extended outlets for farm commodities and products and by-products thereof. Such research and development shall be devoted primarily to those commodities in which there are regular or seasonal surpluses and their products and by-products."

More recently Congress enacted legislation called the "Research and Marketing Act of 1946" which authorized additional research on the utilization of certain agricultural commodities.

Administration:

The four Regional Research Laboratories are administered by the Bureau of Agricultural and Industrial Chemistry. The Bureau is in turn one of the seven research bureaus which constitute the Agricultural Research Administration. Through the Administration, the scientific investigations of the United States Department of Agriculture are coordinated and formal working relationships are maintained with the State Agricultural Experiment Stations.

The offices of the Bureau and the Agricultural Research Administration are located in Washington, D.C. G. E. Hilbert is Chief of the Bureau and P. V. Cardon is the Research Administrator.

Commodities

The commodities assigned for study at the Eastern Regional Research Laboratory are: apples and other deciduous fruits, vegetables, tobacco, milk by-products, potatoes, hides, tanning materials and leather, honey, maple products, wool by-products of which wool wax or wool grease is most important, and animal fats and oils. The term "animal fats and oils" as used in our laboratories does not include butter nor fish oils, research work on these two fats being done by other government agencies.

Animal Fat and Oil Research

Although problems connected with the use of edible animal fats particularly lard have received substantial attention, the major part of our research on animal fats and oils is devoted to development of new industrial uses. We are not concerned with service type of work and in general would not feel justified in investigating production and processing problems of the fat industry except when it seemed obvious that successful new uses depended on production of a better basic raw material, or when a promising new product required the development of a process satisfactory for its production.

Although the Oil and Fat Division of the Eastern Regional Research Laboratory is primarily responsible for the work on animal fats and oils including wool grease, the research work on these commodities is not confined to the members of this division. Members of the staff of the Chemical Engineering and Development Division, headed by R. K. Eskew, as well as of the Analytical & Physical Chemistry Division, headed by B. A. Brice, also have assignments and responsibilities in this field of work and are making important contributions.

The present staff of the Oil & Fat Division consists of about 30 people of whom about 20 have college degrees; the other 10 are chiefly sub-professional laboratory assistants of whom several are taking part-time college training. Probably the equivalent of about 2 people in the Chemical Engineering Division and 6 people in the Analytical & Physical Chemistry Division are also working on problems dealing with fats and oils.

The Division is divided at present into 4 sections, each assigned to a specific field of work and each headed by a capable and responsible research leader. These sections and their heads are:

Chemical Modification.....	J. T. Scanlan
(also includes work on wool grease)	
Composition and Quality.....	R. W. Riemenschneider
Oxidation Products.....	D. Swern
Surface Active Agents.....	A. J. Stirton

A report on the work of this latter Section is our principal interest at this time. This Section devotes its attention to work on soaps, detergents, emulsifiers and similar surface active agents. What is probably our most important contribution in this field was made during the war years in connection with synthetic rubber manufacture.

The type of synthetic rubber produced in greatest volume (GR-S) is made by copolymerization of butadiene and styrene while they are emulsified as minute globules in water. During the early years, seriously inconsistent results were obtained in the polymerization process and it was suspected that the tallow soaps used in preparing the emulsion contained substances that retarded polymerization.

The Eastern Laboratory undertook an investigation of tallow and tallow soaps as a part of the comprehensive research program of the Rubber Reserve Company. A number of universities and several rubber companies and soap manufacturers also participated in this program. These joint investigations succeeded in demonstrating that the polyunsaturated acid content of the tallow soaps were responsible for the difficulty. As a remedy, it was suggested that the tallow be subjected to mild selective hydrogenation before it is used for the preparation of such soap. This treatment has since been used for the preparation of all soap being used in rubber polymerization. In 1946 the soap requirements for synthetic rubber manufacture were about 100 million pounds, but due to imports of natural rubber and the more recent switch to cold rubber the outlet for tallow and grease in this field is now considerably lower. Nevertheless, estimated consumption in this field in 1949 was 22 million pounds.

In connection with this problem the Analytical & Physical Chemistry group at the Eastern Regional Research Laboratory were able to make a very important contribution. The spectrophotometric method of analysis developed by them was the only method capable of determining the polyunsaturated constituents of tallow with the required degree of precision. Accordingly, this method was adopted throughout the industry for control purposes and for incorporation in the specifications used by Rubber Reserve Company for purchase of soap.

In addition to the many uses based on their surface active properties other possibilities exist for the use of soaps. We have devoted considerable effort to the development of soap or soap-like additives for mineral oils. In this work we have cooperated closely with other government agencies, but to date no commercial developments have arisen from it.

As a further example soaps have possible uses as intermediates in organic syntheses, and in some instances advantages may attend such methods of synthesis. We have given some attention to this possibility and only recently have presented a paper at the Meeting of the American Oil Chemists' Society describing the synthesis of certain potentially useful plasticizers by a method which uses soap as an intermediate.

Although such possible uses as the above are recognized, it must be remembered that by far the greatest use of inedible animal fats and oils has historically been in the production of soaps for both home and industrial use in those fields where cleaning, emulsifying and wetting properties are desirable. Since this situation promises to continue for some time it behooves all of us to give special attention to this field.

Although the animal fats are very important raw materials for soap making, and more tallow is used in soap making than any other single fat, soaps made entirely from animal fats may be said to be the exception. Two such exceptions are 100% tallow flake soap for commercial laundries and the soap made for use in the emulsion polymerization used in the production of GR-S synthetic rubber mentioned previously. For most soaps, however, tallow is blended with other oils and fats.

This situation has arisen because soapmakers have recognized that soaps derived wholly from animal fats have some important deficiencies. It now seems apparent that the blending of fats has not constituted a complete solution to all of the problems inherent in the chemical nature of a soap and emphasis is needed on the preparation of synthetic detergents from fats. Successful developments in this direction would tend to maintain or possibly increase the outlet for animal fats in the cleansing field. Accordingly we are giving considerable attention to the preparation of synthetic detergents from fats which may not have the defects inherent in soaps or may have them only to a degree which can be overcome by the addition of dispersing or sequestering agents, or by suitable blending.

Although most of the present commercially important synthetics derived from fats are made from the lauric acid oils, chiefly coconut oil, it is our impression that the possibilities of deriving them from animal fats has not been sufficiently explored. From a review of the available information regarding the properties of the various derivatives of acids found in

tallow, it would seem that the possibility of making satisfactory and competitive detergents from tallow or its constituent acids has not been sufficiently explored. We hope to be of assistance in correcting this lack of knowledge.

Of course, it is also possible to improve the acceptance of soaps by improving them for specific uses as has been done in the case of the Rubber Reserve soaps. Generally speaking this requires the use of improved raw materials and intermediates. Possibilities in this direction are increased as a result of the recent development of an improved technical grade of oleic acid at the Eastern Regional Research Laboratory. This product already in commercial production should be capable of yielding products having improved color and odor stability and improved solubility properties because of its relative freedom from both polyunsaturates and stearic acid.

Time does not permit elaboration of all the possibilities for maintaining and improving the competitive position of inedible tallow and greases in these important fields but we trust the above statements will demonstrate the fact that possibilities do exist, and that we are working on them to the best of our ability. Thank you. (Applause)

CHAIRMAN WILSON: Thank you very much, Dr. Ault.

We are running late and we shall not have any time for questions and answers at this time. However, Mr. Peet tells me that we will have a little time following the Secretary's address, because he has to leave immediately after his talk to catch a train back to Washington. We will, therefore, have an opportunity after the luncheon to ask questions. I suspect that all three of these men will stay for lunch.

I would like to suggest that we adjourn immediately to the Grand Ballroom because the Secretary is here and lunch is ready to be served.